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Responsible Office: Office of Safety and Mission Assurance

Appendix B. Summary of Minimum Fundamental U.S. Federal Aviation Administration (FAA) and Eastern and Western Range (EWR) Safety and Mission Assurance Process Requirements for Experimental Aerospace Vehicle (EAV) Programs/Projects

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The following six basic program/project requirements are summarized from 14 CFR Chapter III (FAA) and the range safety requirement documents (i.e., EWR 127-1). These requirements are not to be considered as all-inclusive but are provided to assist the program/project manager in understanding which fundamental requirements must be met. These requirements form the basis for developing an acceptable safety risk mitigation plan for EAV projects.

B.1 Casualty Expectation

A risk assessment is nominally performed by an independent entity with support from the project. The project is required to collaborate with range safety officials on an assessment of the EAV's probability of failure to be used in risk calculations (Requirement 21107). Operations that can be performed in sterilized airspace (accommodated by the affected range(s) and/or FAA) may do so without an expectation of casualty (E_c) calculation based on the fact that there will not be any persons or property to injure/damage. The numerical standard shall be consistent with the current Range Commanders Council Standard 319-00, Common Risk Criteria for National Test Ranges.This standard is twofold. For a single test mission, an individual's risk per mission shall be less than one chance in a million (1.0×10^{-6}) [does not apply to flight crew] (Requirement 31533). Second, the collective risk of the population exposed to risk from the test mission shall be less than 30 chances in a million (30×10^{-6}) (Requirement 31534). This is the basic E_c, which underlies all discussion of risk. By having a specific goal, the program/project can allocate risk in order to meet this goal while maximizing the mission success objectives. This risk level is assessed against the overall mission and takes into account hardware, ground track, and operational scenarios. Implicit in the development of overall risk, the project will be required to identify and assess potential failures and their impact on risk (Requirement 31535). Requests for variance to the E_c requirements must be addressed through the host range commander (Requirement 31536).

B.2 Operations

The EAV operator should use a structured analytical approach in preplanning for orbital, suborbital, and entry flight by developing detailed flight rules, procedures, and checklists prior to the Flight Readiness Review, for both nominal and contingency operations. The EAV operator shall document scenarios that allow for continued safe flight and landing or flight termination in a manner that minimizes risk in off-nominal situations (Requirement 21109).

B.3 Deorbit Burn

The reliability of the deorbit burn system to achieve controlled entry to the targeted landing site or debris footprint shall be at least 0.99 (Requirement 21109). The intent is to provide some assurance that the vehicle will be

deorbited in a predictable manner. Requests for variance to this requirement must be addressed from the program manager through the Associate Administrator for Safety and Mission Assurance (Requirement 31537).

B.4 Commit to Deorbit

An entry operation may not be initiated until conditions critical to safety have been confirmed (Requirement 21110). Commit to deorbit shall be initiated (enabled) via EAV operator control (Requirement 31538). Flight path and landing zone preparation (i.e., airspace clearance, notices, alerts) may have a major impact on personnel safety and E_c estimates.

B.5 Notification

The EAV operator shall coordinate, develop procedures, and demonstrate (in conjunction with the host range and/or FAA), prior to launch and reentry, the capability to notify maritime and aviation authorities with sufficient time to clear the trajectory, ground-track, and emergency abort areas (if applicable) of traffic (Requirement 21111).

B.6 Flight Termination

The requirement for a flight termination system (FTS) shall be determined by NASA with the cognizant range commander(s) for the range(s) on which the vehicle will perform its flight testing to ensure that the FTS is not susceptible to unauthorized or unwanted signals (Requirement 21112). NASA EAV program/project managers should consider the use of a secure FTS. The method and design of the FTS shall be established in negotiations with range safety officials early in the development of EAV's (Requirement 31539). The FTS security assessment shall be performed in accordance with National Security Telecommunications and Information Systems Security Policy Number 12, National Information Assurance Policy for U.S. Space Systems, NPR 2810.1, Security of Information Technology, and the host range documentation (Requirement 31540). The decision to use a secure FTS will be made by NASA and the cognizant FTS organization in accordance with NPR 2810.1. Additionally, a certified Range Safety Officer shall perform the real-time hazard mitigation actions (Requirement 31540).

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